UNPUBLISHED
RESEARCH
REPORTS

INTERMOUNTAIN STATION
Central Reference File
No. 3.404

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT INVESTIGATIONS

A METHOD FOR THE PRESENTATION OF HABITAT MOUNTS OF INSECTS

By
Donald De Leon

National Park Service
Berkeley, Calif.
Feb. 21, 1934

U.S. GOVERNMENT PRINTING OFFICE 60918

FILE COPY
MISSOULA
FOREST INSECT
LABORATORY

JNS M1-40 EC. File Preservation of Insects.

A METHOD FOR THE PRESENTATION OF HABITAT MOUNTS OF INSECTS

Donald De Leon
National Park Service
Berkeley, Calif.

Abstract.

A method of preparing insect larvae in a dry but life-like form is described. An account is given of the preparation of habitat mounts of barkbeetles using this method of preparing the immature stages.

Although a good method for the preservation of insect larvae in a dry though life-like manner has been employed in Europe for some years, it seems to be little known or used in the United States. By employing this method of preserving the immature stages and then replacing them in natural positions in or on their host, a very natural, instructive, and attractive mount can be made. This method seems particularly well adapted for the presentation of habitat mounts of barkbeetle life histories and associations.

The method described here of dehydrating and preserving the immature stages seems to be rather widely known in Europe, but no published references to it can be found.

Equipment Used.

10 Stender or Coplin jars or similar containers
Alcohol: 70%, 90%, absolute.
Xylol.
Turpentine U.S.P.
Wire baskets.

The jars were set up with the above reagents in the following order and proportions: 70% alcohol; 90% alcohol; absolute alcohol; absolute alcohol; equal proportions absolute alcohol and xylol; xylol; equal proportions xylol and turpentine; turpentine. The ground glass portion of the lids of the jars were coated with vaseline to prevent evaporation.

The wire baskets were made from #36 copper gauze but a much coarser mesh could be used if only large specimens are to be treated. The size of the baskets would naturally depend on the size of the material to be used. Those used by the writer were about one inch high and slightly over one half inch across, and made from wire gauze about 1½" by 2½" in size.

Method.

In order to get satisfactory results, living specimens should be used. These are dropped into water ready to boil, which is then covered and set aside to cool. Larvae that tend to curl up when placed in hot water, as clerids, ostomatids, and dolichopodids seem to straighten out better if left in the water until it becomes tepid, than if removed from the water when it is hot. When the water has cooled the specimens are pricked one or two times, depending on their size, with a finely pointed needle, dropped into a basket and placed in the first jar of the series, containing 70% alcohol. The material is run up through the succeeding liquids at hour intervals. When the specimens finish their second bath of turpentine they are shaken out of the basket onto some sort of blotting paper and allowed to dry. It takes about 6 hours for them to dry thoroughly at ordinary room temperatures. When dry they are ready for use. Larvae several years old, prepared in this manner and mounted on pins were observed in the forest insect collection of the Hochschule fuer Bodenkultur, Vienna. Acknowledgment is made to Dr. Erwin Seniritschek of the forementioned institution, who first outlined this method to the writer.

When many larvae are run through together, a white precipitate is often present on a good many of them but this can be easily removed by moistening a camel's hair brush in turpentine and wiping the precipitate off. Although the larger larvae shrink noticeably the shrinkage of the smaller larvae is not usually appreciable. A cerambycid larva that was 34 mm. long when cooked, was 29 mm. long after it had been subjected to the above outlined treatment; otherwise it was in excellent condition and undistorted. Colored larvae, as clerids, lose a bit of their color when handled by this method; white or whitish larvae come out almost pure white; and the sclerotized portions of the body are unaffected. Though the treated specimens are rather brittle, they will stand considerable handling either with the fingers or with forceps. To eliminate this brittleness a three to eight hour bath, made up of 9 parts turpentine and 1 part rubber cement by weight, was given some of the specimens after they were taken out of the last jar containing turpentine. This treatment makes the material more flexible but adds a shine and it is doubted if it would work on any but glabrous or nearly glabrous larvae. Larvae have been left in any one of the baths several days without any apparent injury, except that the colored larvae may be considerably bleached when left in xylol or turpentine.

Several larvae such as tipulids and lucanids which at the time of treatment did not have much of a fat-body came through the baths in worthless condition. Best results seem to be had from good fat larvae; apparently the method is suitable only when there is a considerable layer of fat beneath the cuticula that can be coagulated, like an egg, by boiling. Occasionally, however, flathead larvae,(Melanophila) that apparently had a good layer of fat, were rendered useless by this treatment for any purpose but the waste basket.

Preparation of Mounts.

The writer in making up a series of habitat exhibits of barkbeetles used 5" x 6" Riker mounts. Bark from barkbeetle infested lodgepole pine, sugar pine, and ponderosa pine was cut to fit the glass half of a mount snugly. Rubber cement thinned with gasoline was then applied to the inner surface of the prepared section of bark to liven its appearance, hold the frass in place in the galleries, and keep the inner surface of the glass from becoming covered with dust. Shellac would probably do as well but was not tried. When the cement was dry the treated specimens were replaced in their natural positions with glue. Thus a complete picture of the appearance of the inner bark of an infested tree was obtained. Not only was the work of the insect to be seen but the insect itself in all stages and surrounded with its associated species. On the outer surface of the bark such species as adult clerids, ostomatids, cucujids, etc., were glued to show the insects found in this habitat. Insect points about the color of the cambium and on which a number was printed at the larger end of the point were fastened to the surface pointing at the desired object. The number refered to an accompanying explanatory sheet, which gives the name of the insect and a short account of its habits and importance.

The completed bark sample was then placed in the glass half of the Riker mount and pinned in as though it were the lower half but so the specimens did not touch the glass. With thin bark as that of lodgepole pine, the glass half of an ordinary mount was used and another piece of glass was cut to fit flush with the outer sides of this half and fastened down with Scotch tape in the same manner as one would use passe partout. With thick bark, Riker mounts 2 7/8" deep can be used and cut down to the thickness of the bark. In this manner both the inner and outer surfaces of the same piece of bark were used to show the internal and external appearance of the bark of an infested tree. Figures 1 and 2.

If habitat mounts are not desired cotton mounts can be prepared as in figure 3 showing the common insects found in a given

species of tree.

As the brood of the western pine beetle is entirely concealed in the outer bark of its host it was necessary in making up a mount of this insect to make an axe-like cut at one corner of the bark sample to expose the brood galleries. Specimens of the larvae and pupae were then fastened into these exposed galleries.

To improve the appearance of the mounts requiring the use of collars the inner surface was painted a dead black with india ink.

This method of preservation will probably work for small caterpillars, fly larvae, and hymenopterous larvae, as well as other beetle larvae. By its use it is possible to make instructive mounts rather quickly and cheaply and should aid materially in making up worthwhile mounts for class room work and exhibition purposes.

Acknowledgment is made to Mr.J.M.Miller and Mr.R.L. Furniss, both of the Bureau of Entomology, for suggestions and criticisms during the preparation of the mounts.

February 21, 1934.

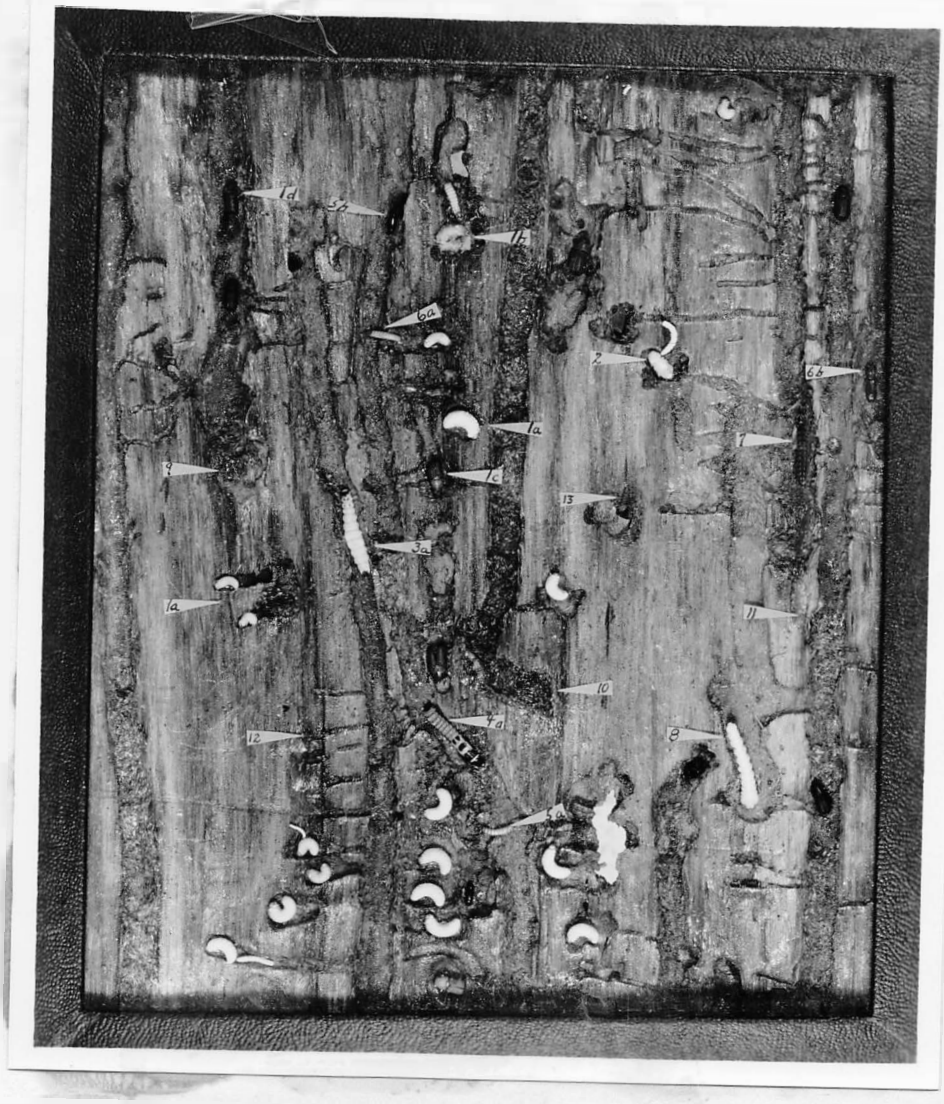

Figure No. 1. Photograph of Riker mount, showing mountain. pine beetle and associates in lodgepole pine.

Figure No. 2. Photograph of Riker mount, showing western pine beetle.

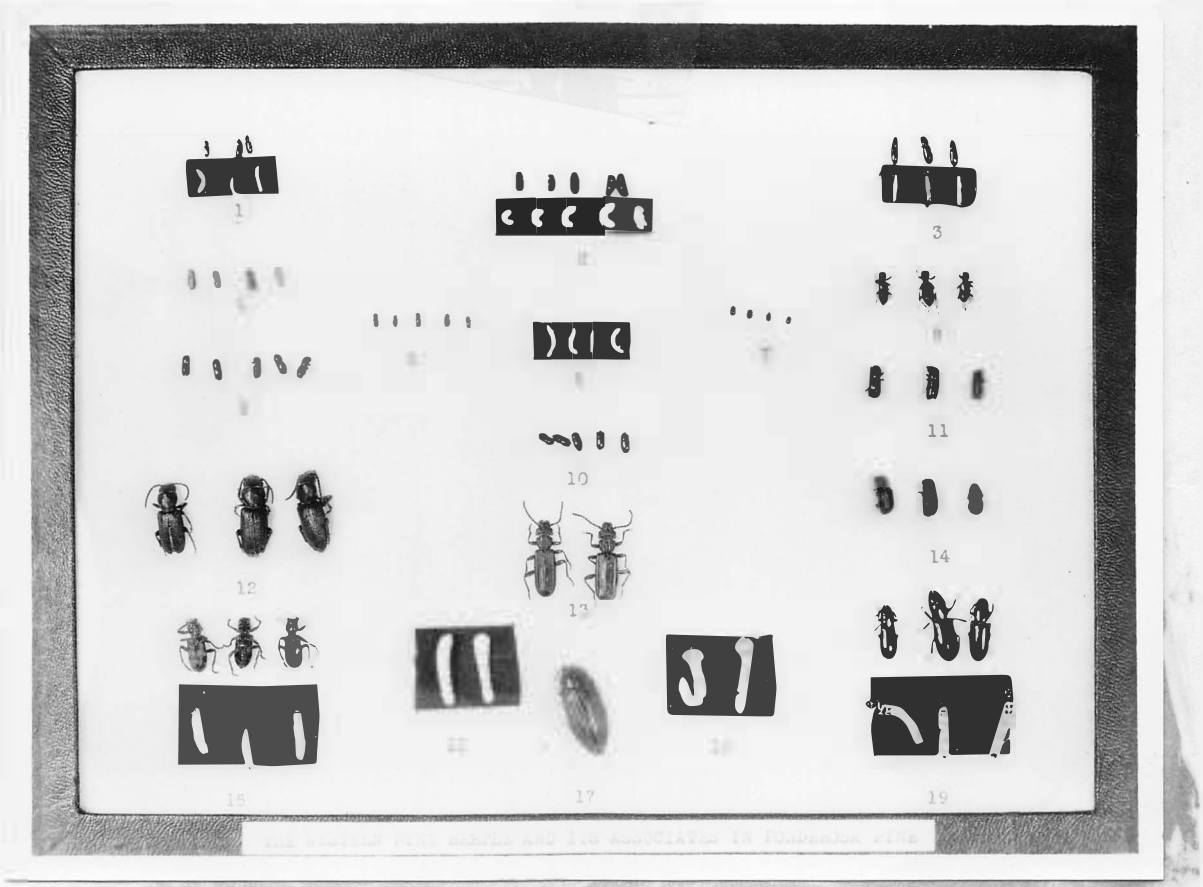

Figure No. 3. Photograph of Riker mount, showing western pine beetle and its asscciates in ponderosa pine.

A METHOD FOR THE PRESENTATION OF HABITAT MOUNTS OF INSECTS

Donald De Leon
National Park Service
Berkeley, Calif.

Abstract.

A method of preparing insect larvae in a dry but life-like form is described. An account is given of the preparation of habitat mounts of barkbeetles using this method of preparing the immature stages.

Although a good method for the preservation of insect larvae in a dry though life-like manner has been employed in Europe for some years, it seems to be little known or used in the United States. By employing this method of preserving the immature stages and then replacing them in natural positions in or on their host, a very natural, instructive, and attractive mount can be made. This method seems particularly well adapted for the presentation of habitat mounts of barkbeetle life histories and associations.

The method described here of dehydrating and preserving the immature stages seems to be rather widely known in Europe, but no published references to it can be found.

Equipment Used.

10 Stender or Coplin jars or similar containers
Alcohol: 70%, 90%, absolute.
Xylol.
Turpentine U.S.P.
Wire baskets.

The jars were set up with the above reagents in the following order and proportions: 70% alcohol; 90% alcohol; absolute alcohol; absolute alcohol; equal proportions absolute alcohol and xylol; xylol; equal proportions xylol and turpentine; turpentine. The ground glass portion of the lids of the jars were coated with vaseline to prevent evaporation.

The wire baskets were made from #36 copper gauze but a much coarser mesh could be used if only large specimens are to be treated. The size of the baskets would naturally depend on the size of the material to be used. Those used by the writer were about one inch high and slightly over one half inch across, and made from wire gauze about 1½" by 2½" in size.

Method.

In order to get satisfactory results, living specimens should be used. These are dropped into water ready to boil, which is then covered and set aside to cool. Larvae that tend to curl up when placed in hot water, as clerids, ostomatids, and dolichopodids seem to straighten out better if left in the water until it becomes tepid, than if removed from the water when it is hot. When the water has cooled the specimens are pricked one or two times, depending on their size, with a finely pointed needle, dropped into a basket and placed in the first jar of the series, containing 70% alcohol. The material is run up through the succeeding liquids at hour intervals. When the specimens finish their second bath of turpentine they are shaken out of the basket onto some sort of blotting paper and allowed to dry. It takes about 6 hours for them to dry thoroughly at ordinary room temperatures. When dry they are ready for use. Larvae several years old, prepared in this manner and mounted on pins were observed in the forest insect collection of the Hochschule fuer Bodenkultur, Vienna. Acknowledgment is made to Dr.Erwin Schimitschek of the aforementioned institution, who first outlined this method to the writer.

When many larvae are run through together, a white precipitate is often present on a good many of them but this can be easily removed by moistening a camel's hair brush in turpentine and wiping the precipitate off. Although the larger larvae shrink noticeably the shrinkage of the smaller larvae is not usually appreciable. A cerambycid larva that was 34 mm. long when cooked, was 29 mm. long after it had been subjected to the above outlined treatment; otherwise it was in excellent condition and undistorted. Colored larvae, as clerids, lose a bit of their color when handled by this method; white or whitish larvae come out almost pure white; and the sclerotized portions of the body are unaffected. Though the treated specimens are rather brittle, they will stand considerable handling either with the fingers or with forceps. To eliminate this brittleness a three to eight hour bath, made up of 9 parts turpentine and 1 part rubber cement by weight, was given some of the specimens after they were taken out of the last jar containing turpentine. This treatment makes the material more flexible but adds a shine and it is doubted if it would work on any but glabrous or nearly glabrous larvae. Larvae have been left in any one of the baths several days without any apparent injury, except that the colored larvae may be considerably bleached when left in xylol or turpentine.

Several larvae such as tipulids and lucanids which at the time of treatment did not have much of a fat-body came through the baths in worthless condition. Best results seem to be had from good fat larvae; apparently the method is suitable only when there is a considerable layer of fat beneath the cuticula that can be coagulated, like an egg, by boiling. Occasionally, however, flathead larvae,(Melanophila) that apparently had a good layer of fat, were rendered useless by this treatment for any purpose but the waste basket.

Preparation of Mounts.

The writer in making up a series of habitat exhibits of barkbeetles used 5" x 6" Riker mounts. Bark from barkbeetle infested lodgepole pine, sugar pine, and ponderosa pine was cut to fit the glass half of a mount snugly. Rubber cement thinned with gasoline was then applied to the inner surface of the prepared section of bark to liven its appearance, hold the frass in place in the galleries, and keep the inner surface of the glass from becoming covered with dust. Shellac would probably do as well but was not tried. When the cement was dry the treated specimens were replaced in their natural positions with glue. Thus a complete picture of the appearance of the inner bark of an infested tree was obtained. Not only was the work of the insect to be seen but the insect itself in all stages and surrounded with its associated species. On the outer surface of the bark such species as adult clerids, ostomatids, cucujids, etc., were glued to show the insects found in this habitat. Insect points about the color of the cambium and on which a number was printed at the larger end of the point were fastened to the surface pointing at the desired object. The number refered to an accompanying explanatory sheet, which gives the name of the insect and a short account of its habits and importance.

The completed bark sample was then placed in the glass half of the Riker mount and pinned in as though it were the lower half but so the specimens did not touch the glass. With thin bark as that of lodgepole pine, the glass half of an ordinary mount was used and another piece of glass was cut to fit flush with the outer sides of this half and fastened down with Scotch tape in the same manner as one would use passe partout. With thick bark, Riker mounts 2 7/8" deep can be used and cut down to the thickness of the bark. In this manner both the inner and outer surfaces of the same piece of bark were used to show the internal and external appearance of the bark of an infested tree. Figures 1 and 2.

If habitat mounts are not desired cotton mounts can be prepared as in figure 3 showing the common insects found in a given

species of tree.

As the brood of the western pine beetle is entirely concealed in the outer bark of its host it was necessary in making up a mount of this insect to make an axe-like cut at one corner of the bark sample to expose the brood galleries. Specimens of the larvae and pupae were then fastened into these exposed galleries.

To improve the appearance of the mounts requiring the use of collars the inner surface was painted a dead black with india ink.

This method of preservation will probably work for small caterpillars, fly larvae, and hymenopterous larvae, as well as other beetle larvae. By its use it is possible to make instructive mounts rather quickly and cheaply and should aid materially in making up worthwhile mounts for class room work and exhibition purposes.

Acknowledgment is made to Mr.J.M.Miller and Mr.R.L. Furniss, both of the Bureau of Entomology, for suggestions and criticisms during the preparation of the mounts.

February 21, 1934.

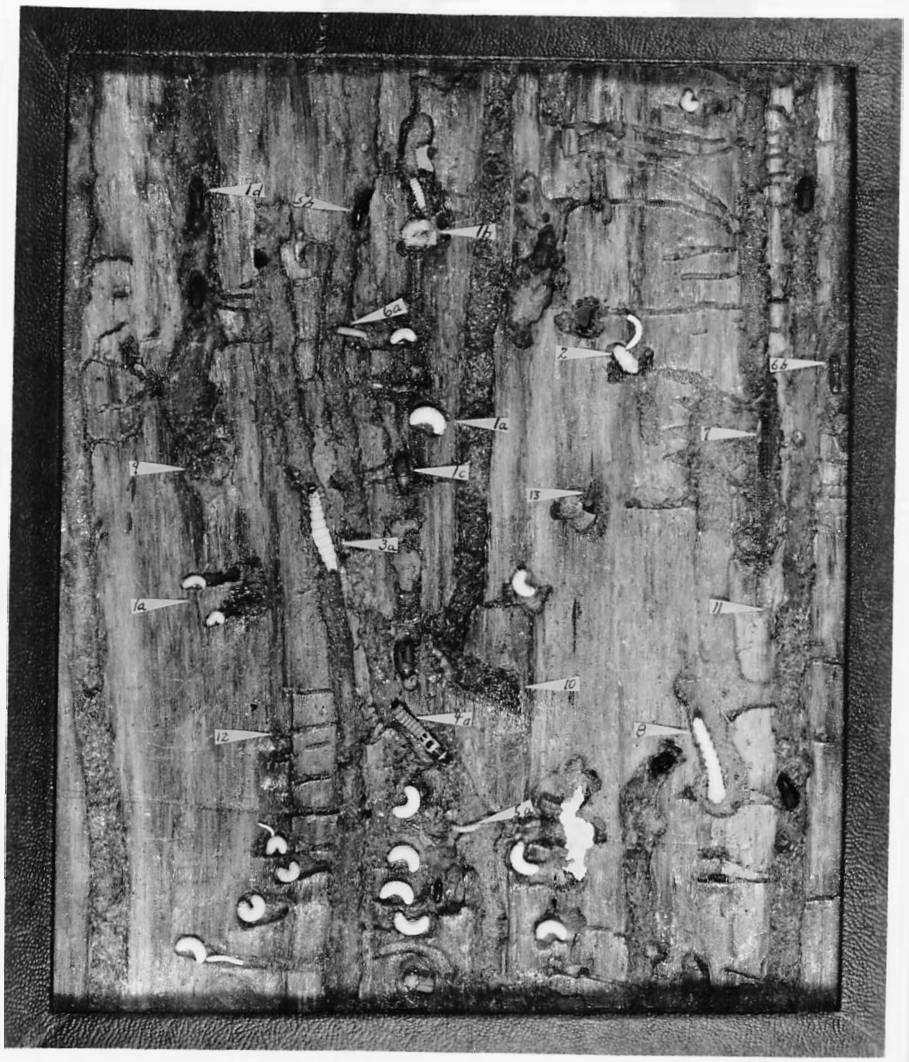

Figure No. 1. Photograph of Riker mount, showing mountain pine beetle and associates in lodgepole pine.

Figure No. 2. Photograph of Riker mount, showing western pine beetle.

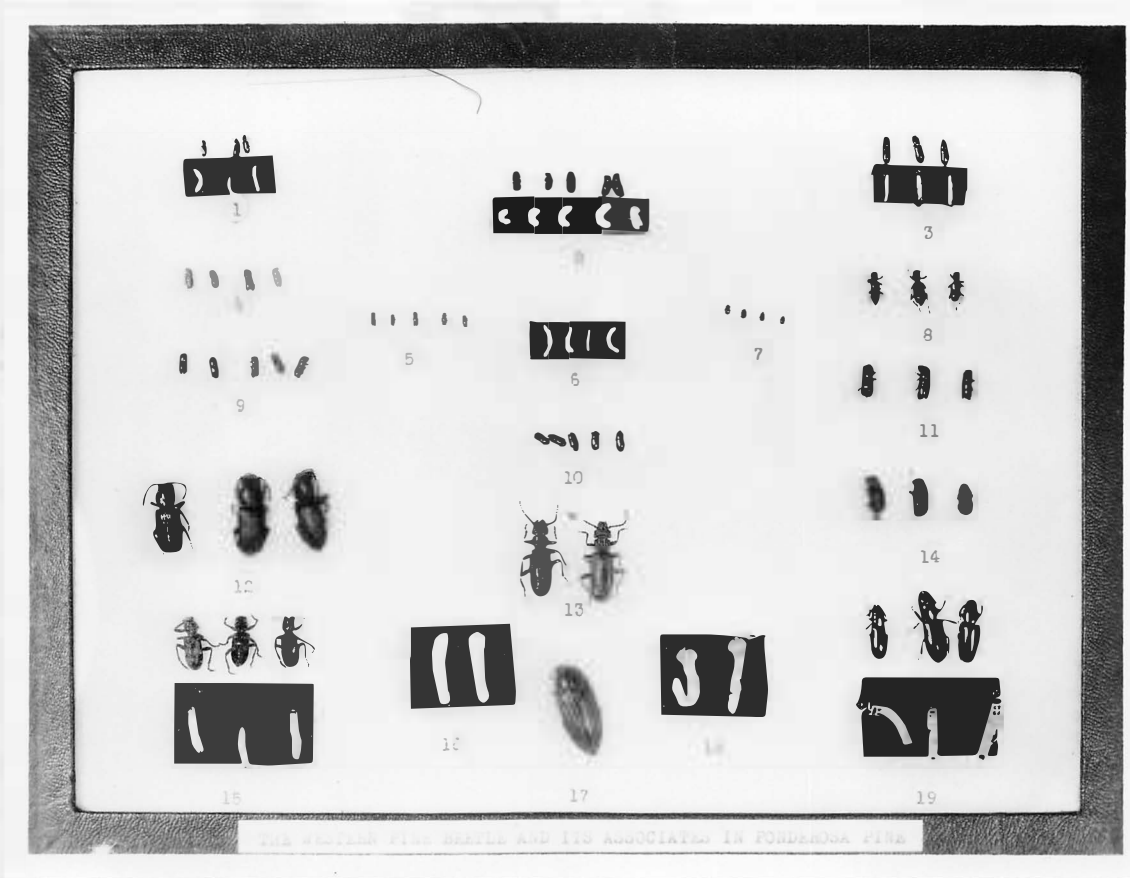

Figure No. 3. Photograph of Riker mount, showing western pine beetle and its associates in ponderosa pine.